

CLAIMS

1. A method of regenerating a particle filter for an internal combustion engine exhaust line, wherein particles lining the walls of the filter are heated to a 5 temperature higher than their combustion temperature, which method is characterized in that:

- the heat necessary to heat said particles is produced by adding to a solid first compound present in a reactor a gaseous second compound adapted to combine with 10 said first compound to form a solid third compound by way of an exothermic first reaction, and

- the heat resulting from the combustion of said particles is used to regenerate said solid first compound present in said reactor and said gaseous second compound 15 by way of an endothermic second reaction that is the opposite of said exothermic first reaction.

2. A method according to claim 1, characterized in that the heat necessary to heat the particles is transmitted 20 to them and the heat necessary to regenerate the solid first compound is transmitted to the solid third compound through the walls of the particle filter.

3. A method according to claim 1 or claim 2, 25 characterized in that the heat necessary to heat the particles is transmitted to them and the heat necessary to regenerate the solid first compound is transmitted to the solid third compound by means of the exhaust gas passing through said exhaust line.

30 4. A method according to any one of claims 1 to 3, characterized in that said solid first compound is lime CaO and said second compound is steam.

35 5. An internal combustion engine exhaust line (1), of the type including a particle filter (2) and means for regenerating it, adapted to heat particles lining the

walls of the filter (2) to a temperature greater than their combustion temperature, which exhaust line is characterized in that said means comprise:

- a reactor (6) containing a solid first compound;
- 5 - an evaporator (9) for vaporizing a second compound (8) able to combine with said solid first compound to form a solid third compound by way of an exothermic reaction;
- means (12, 13, 14, 16, 17) for establishing communication between said evaporator (9) and said reactor (6) on command;
- means for communicating to said particles the heat generated by combining said first and second compounds;
- means for communicating to said solid third compound the reaction heat generated by the combustion of said particles so as to cause regeneration of said first and second compounds during said combustion;
- means (15, 19) for collecting said second compound in gaseous form during said regeneration of the first and second compounds and for transmitting it to a condenser (7) for liquefying it; and
- means (10, 11) for establishing communication between said condenser and said evaporator on command.

25 6. An exhaust line (1) according to claim 5, characterized in that a reactor (6) containing the solid first compound is integrated into the particle filter (2).

30 7. An exhaust line (1) according to claim 5 or claim 6, characterized in that a reactor (6) containing the solid first compound is placed against the outside wall of the exhaust line (1).

35 8. An exhaust line (1) according to claim 7, characterized in that said means for communicating to said solid third compound the reaction heat generated by

the combustion of said particles include a heat pipe (21) for collecting heat from the exhaust gas on the downstream side of the particle filter.

5 9. An exhaust line (1) according to claim 5, characterized in that said reactor (6) containing said solid first compound is placed inside or outside the exhaust line (1) on the upstream side of the particle filter (2) on the normal path of the exhaust gas, and the
10 means for communicating to said solid third compound the reaction heat generated by the combustion of said particles include branch pipes (22, 23) and valves (24, 25) for modifying the path of the exhaust gas in such a manner as to place said reactor (6) that is on the
15 downstream side of the particle filter (2) on the path of the exhaust gas during regeneration of the first and second compounds.

10. An exhaust line (1) according to claim 5, characterized in that said reactor (6) containing said solid first compound is placed inside or outside the exhaust line (1) on the downstream side of the particle filter (2) and it includes a heat pipe for transmitting heat generated by the combination of said first and
25 second compounds to the particle filter (2) and/or to the exhaust gas on the upstream side of the particle filter.

11. An exhaust line (1) according to any one of claims 5 to 10, characterized in that it includes means for
30 detecting clogging of the particle filter (2) and for triggering regeneration of said particle filter (2).

12. An exhaust line (1) according to any one of claims 5 to 11, characterized in that it includes means for
35 detecting initiation of the reaction of combustion of the particles lining the filter and for triggering the establishing of communication between said reactor (6)

and said condenser (7).

13. A particle filter (2) for an internal combustion engine exhaust line (1), characterized in that it
5 includes a reactor (6) situated away from the path of the exhaust gas and containing a solid first compound able to react with a second compound by way of a reversible exothermic reaction in such manner as to heat the walls of said filter (2) to a temperature greater than the
10 combustion temperature of particles said filter (2) is intended to capture.

14. A particle filter according to claim 13, characterized in that a reactor (6) is placed around said
15 filter.

15. A particle filter (2) according to claim 13 or claim 14, characterized in that a reactor (6) is integrated into said filter.